3-D Imaging • Chancellor Retires • Bloodless Surgery
The Rev. Bernice A. King was guest speaker at a luncheon for minority medical students in January, in observation of Martin Luther King, Jr. Day. The youngest child of Coretta Scott King and the late Dr. Martin Luther King, Jr., Bernice King is now a nationally renowned orator. Ordained as a Baptist minister in May 1990, she currently is associate minister at Greater Rising Star Baptist Church in Atlanta, where she oversees the Singles Adult Ministry.
Chancellor William H. Danforth, M.D. — along with his wife, Elizabeth or "Ibb" — has steered Washington University for almost a quarter of a century. For more about the chancellor's tenure, see the story beginning on page 16.

Photograph by Phoenix Photography

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THE COVER

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Photograph by Phoenix Photography

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Scholarly Pursuits

THIRD-year medical student Jennifer Payne was one of 41 students selected from medical schools around the country to participate in the yearlong Howard Hughes Medical Institute-National Institutes of Health Research Scholars Program.

Jennifer Payne

Payne, whose medical interest is in neurology, took a year off from medical school to conduct research at the NIH because she is interested in academic medicine. At Washington University, she worked with John C. Morris, M.D., who heads the Memory and Aging Project. At NIH, she is working in the laboratory of adaptive systems, where she is studying the potential role of the molecular mechanisms of memory in Alzheimer's disease.

"The research experience is invaluable; the whole experience has been phenomenal," says Payne, who will return to medical school this fall. "I'm working in a top-notch laboratory (with scientists) whose work I was reading a year ago. That's exciting. I've attended two neuroscience conferences (in Miami and Florence, Italy) where I've had the opportunity to hear different perspectives on subjects I was interested in."

The HHMI-NIH program was established in 1985. It provides at least nine months of supplementary medical school experience in the fundamentals of biomedical scientific investigation. Payne lives at the Cloister, formerly a cloistered convent, with other research scholars. She is one of four medical students from Washington University to have participated in the program since its inception.

A Distinguished Neuroscientist

SIDNEY Goldring, M.D., professor emeritus of neurological surgery, received the 1994 American Epilepsy Society-Milken Distinguished Neuroscientist Award for Epilepsy Research last December.

Epilepsy affects more than 2 million Americans. Some 50,000 to 60,000 of them cannot control their symptoms with medication and are potential candidates for surgical removal of brain tissue that triggers seizures.

Goldring in the 1970s developed a technique that allows the brain of a child to be mapped while the patient is awake in a comfortable hospital room. The electrical testing method enables surgeons to precisely locate the area of the brain that is active just before a seizure begins. Electrical testing also identifies the functional areas of the brain. If the abnormal tissue is not in a region that is vital to motor, sensory or language function, the patient undergoes a second stage of the surgery, and the tissue is removed.

Goldring served as head of neurological surgery and co-head of the Department of Neurology and Neurological Surgery from 1974 to 1990.

A Lifetime Of Achievements

TERESA Vietti, M.D., professor of pediatrics and radiation oncology, was honored last December by The American Society of Pediatric Hematology/Oncology with its 1994 Distinguished Career Award.

From 1970 to 1986, Vietti served as director of the division of pediatric hematology/oncology at St. Louis Children's Hospital and the School of Medicine and as chair of the Pediatric Oncology Group — an international multidisciplinary childhood cancer research group — from 1980 to 1993.

Vietti has played a critical role in training many pediatric hematologists/oncologists who are in important leadership positions today.

A New Alumni Endowed Professor

CARL Frieden, Ph.D., professor of biochemistry and molecular biophysics, has been named an Alumni Endowed Professor.

Frieden came to Washington University in 1955 with interests in enzyme kinetics and mechanisms. He currently studies how proteins, which begin as long strings of amino acid building blocks, adopt their three-dimensional shapes.

Frieden was elected to the National Academy of Sciences in 1988 and became a fellow of the American Association for the Advancement of Science that year. He received a MERIT (Method to Extend Research in Time) Award from the National Institutes of Health in 1986 and the American Chemical Society St. Louis Award in 1976. He served as interim head of the Department of Biochemistry from 1986 to 1989 and director of the combined M.D./Ph.D. program at Washington University from 1986-91.
Stupp Professorship

EUGENE M. Johnson, Jr., Ph.D., professor of molecular biology and pharmacology, has become the first Norman J. Stupp Professor of Neurology.

Johnson joined the faculty in 1976 and began to study nerve growth factor, a diffusible protein that some nerve cells need for survival. In 1986, he suggested that neurons "commit suicide" when deprived of this factor. His lab has subsequently constructed a road map and timetable for many of the biochemical and genetic changes that occur between an initial perturbing event and the ultimate commitment to die. The group also has uncovered essential components of the pathway to suicide.

Johnson directs the School of Medicine's National Research Service Award Training Program in Neuropharmacology and is associate director of its Alzheimer's Disease Research Center.

The St. Louis-based Norman J. Stupp Foundation supports medical research, education and model programs. The foundation was established by Norman Jacob Stupp and his wife, Marie, in 1952.

AAAS Honors Deuel And Van Essen

THOMAS F. Deuel, M.D., and David C. Van Essen, Ph.D., have been named fellows of the American Association for the Advancement of Science (AAAS) for their scientifically distinguished advances in science.

Deuel, the Lewis T. and Rosalind B. Apple Professor of Oncology in Medicine, is also professor of medicine and biochemistry and molecular biophysics. He has conducted pioneering studies on the roles of growth factors in the development of tumors. In the 1980s, he purified a protein named platelet-derived growth factor (PDGF), which promotes wound healing and plays roles in development.

Deuel directs the hematology division at Jewish Hospital and is co-director of the hematology division at the School of Medicine.

Van Essen, who is Edison Professor of Neurobiology and head of the Department of Anatomy and Neurobiology, was honored for his research on the part of the brain that processes visual information. His group has integrated anatomical, physiological and computational techniques to explore the organization and function of the visual cortex in the macaque monkey. This work, combined with that in other labs, has revealed that at least 32 separate areas take part in visual processing and that more than 300 separate pathways interconnect these regions of brain tissue.

Van Essen directs the Washington University McDonnell Center for Higher Brain Function.
Focusing On Older Adults

A DIVISION of geriatrics and gerontology has been established within the Department of Internal Medicine. John Holloszy, M.D., professor of medicine, has been appointed director of the new division, which will be based at The Jewish Hospital of St. Louis.

Geriatric medicine, a subspecialty of internal medicine, focuses on the care of older adults. Gerontology is a broad area of research in medicine, biology and the social and behavioral sciences concerned with the process of aging and the experience of older adults.

Among the main goals of the new division will be to recruit excellent geriatricians to serve as faculty members, and then to develop model systems for providing clinical care to the elderly. The division also will educate students, physicians, other health professionals and the community about the medical, nutritional and environmental needs of older adults.

The program also will seek to advance knowledge of geriatric medicine and gerontology through research. Holloszy and his team of researchers study the effects of aging, including heart function, glucose metabolism, bone mineral metabolism, muscle protein synthesis and lipid metabolism, with the support of a National Institute of Aging program project grant.

Holloszy previously served as director for the Department of Medicine's section of applied physiology, which will be incorporated into the new division of geriatrics and gerontology.

Second-year medical student Todd Vedder was awarded a set of hand-illustrated medical texts for receiving the Ciba-Geigy Award for Community Service. Vedder was among 23 first-, second- and third-year medical students recognized at the Student Awards luncheon in December. Other awardees were: Daniel Schwartz, Penelope Ann Ewbank, Heather Joy Burgin, Amy Rebecca Zarrin, Amy Elizabeth Bane, Ari Scott Brunschwig, Lisa Erlanger, Martha Sue Terry, Joseph Simpson, Ivan Tarle, Alison Medearie Barnes, Natasha Leacock, Henry Ou, Aaron Shields, Samuel Slishman, Robert Arlo Bane, Deborah Suzanne Lindes, Robert Lindsay Young, Joshua Morrey Cooper, Michael Naylor, Rosalia Chipelo Fonseca and Michael George Jakoby IV.

Richard H. Gelberman, M.D.

Gelberman Heads Orthopaedic Surgery

RICHARD H. GELBERMAN, M.D., has been named the Fred C. Reynolds Professor and head of the newly formed Department of Orthopaedic Surgery.

Orthopaedic surgery was formerly a division of the Department of Surgery. New programs will include pediatric oncology, trauma, foot and ankle surgery, reconstructive microsurgery and adult reconstructive surgery.

Gelberman says the new department also will make educational changes. "We will establish a core curriculum and define the educational mission of the new department in an effort to provide a comprehensive educational experience for all of our residents and fellows," he says.

In the area of research, Gelberman says the new department will recruit researchers in molecular biology and in bioengineering to develop programs capable of assessing a variety of fundamental issues.

Prior to accepting the position, Gelberman was professor of orthopaedic surgery at Harvard University Medical School and chief of the Hand Surgery Service at Massachusetts General Hospital. He was with the division of orthopaedic surgery at the University of California, San Diego, from 1977 to 1987.
PT Ranked No. 1

The Program in Physical Therapy has been ranked as the top physical therapy graduate school in the country by U.S. News & World Report. This is the first year the magazine has rated physical therapy programs as part of its annual guide to "America's Best Graduate Schools." In the magazine's ranking of top research-oriented medical schools, the School of Medicine retained its No. 5 position overall, behind Harvard University, Johns Hopkins University, Yale University and Duke University, respectively.

The medical school also was ranked No. 1 in student selectivity, and its Department of Internal Medicine ranked No. 5 following internal medicine departments at Harvard University, Johns Hopkins University, the University of California at San Francisco and Duke University.

Furthering Young Scientists

The Young Scientist Program, organized by students at the Medical Center and designed to attract high school students from disadvantaged backgrounds into scientific careers, has been awarded a $300,000, five-year grant from the Howard Hughes Medical Institute.

The funding will enable the Young Scientist Program (YSP) to expand its three primary components: summer focus, teaching teams and science partners, so that even more students may benefit.

Teaching teams, which reaches about 300 freshmen students each year, is made up of small groups of medical and graduate students who take interactive scientific demonstrations and group problem-solving workshops to high school classrooms; science partners pairs about 50 sophomore students with graduate and medical students to create sustained mentor-student relationships as they meet weekly throughout the school year to examine a scientific topic in detail; and summer focus, which is for juniors in high school, consists of an eight-week internship in biomedical research at the medical school. Only eight students are invited for the summer, and they must attend a series of one-on-one tutorials to strengthen their science background and prepare them for a research project. Students in the summer focus also receive a $2,000 stipend.

Jim McCarter, program co-founder and now a fifth-year M.D./Ph.D. student, is pleased with the program’s results. "The really good news is that of the 22 students who have gone through (summer focus) and who are now in college, all are in science or technical careers,” says McCarter.

Learning How To Lose

The Washington University Weight Management Center, a new weight loss and obesity treatment program, opened in January at the medical school.

The program, created in partnership with Barnes Hospital, treats people who have "medically significant" obesity or body weight that is more than 20 percent above normal. The multidisciplinary program involves doctors, behavior therapists, registered dietitians and exercise specialists who develop individual weight management and exercise programs for each patient.

In the last 10 years, the number of obese Americans has increased to 33 percent from about 25 percent, according to Samuel Klein, M.D., associate professor of medicine and director of the weight management center. Patients in the program learn how to lose weight and maintain their weight loss by setting modest, realistic goals and incorporating moderate exercises. Research has shown that even weight loss of 10 percent can result in considerable health benefits for those with medically significant obesity.

Miss America's Hearing Loss

In the Winter 1994 issue of Outlook, it was reported that Miss America, Heather Whitestone, became deaf as a result of a reaction to a DTP shot. That information, which Whitestone's mother provided to the popular press and was published widely, is apparently incorrect. After the pageant, Whitestone's former pediatrician, Ted Williams, M.D., said her deafness was the result of a bacterial infection, Haemophilus influenzae (Hib), which developed a month after she received the DTP shot.

Although no vaccination for Hib was available at the time of Whitestone's illness, a vaccine was introduced in 1987. Since that time, Hib has been reduced by more than 90 percent.

Outlook, Spring 1995
Evaluating Dialysis Outcomes

Researchers have received a $1.4 million, seven-year grant from the National Institutes of Health to evaluate standards for delivering dialysis.

Dialysis is a treatment given to people whose kidneys can no longer adequately remove toxins from the blood. Dialysis machines remove toxins by pumping blood from the patient through a filtering device called a dialyzer, and then back into the patient. Currently, about 250,000 Americans receive dialysis.

The study, led by James Delmez, M.D., associate professor of medicine, will be conducted through the medical school’s Chromalloy American Kidney Center. Half of the 110 study volunteers will receive a standard amount of dialysis, and half will receive a higher amount, Delmez says. Within each of the groups, half of the patients will be treated with conventional dialyzers and half with special dialyzers that remove additional substances from the blood.

Currently, the special dialyzers are in limited clinical use because they are expensive.

The investigators will gauge the effectiveness of therapy by measuring death rates and hospital admission rates due to cardiovascular disease or serious infection.

The investigation is a follow-up to a similar NIH study conducted 20 years ago, which helped to set the standards for care of dialysis patients. It is being repeated to see whether today’s standards should be revised. Because the dialysis patient population and dialysis technology have changed dramatically in recent decades, results of the initial study may not be relevant today, explains Delmez. Compared to the dialysis population 20 years ago, dialysis patients today are sicker, older and more often are diabetic, he says.

Testing For Tropical Infections

Medical school researchers have received two grants totaling $1.5 million to study filariasis, a group of diseases that affect more than 100 million people in the tropical developing countries of Asia, Africa and Latin America.

Filariasis is transmitted by the bite of insects, namely mosquitoes and black flies, which carry the worm parasites. Infection with the most common species of these tiny worms can lead to elephantiasis, a condition characterized by grotesquely swollen legs and genitalia; another species causes skin disease and blindness.

The five-year National Institutes of Health grants will support filariasis research on two fronts. The first project will allow Gary Well, M.D., associate professor of medicine and the principal investigator of the projects, and his co-workers to continue developing and testing new methods for diagnosing filarial infections in their early stages.

Well and his co-workers will focus their efforts on developing tests for filarial infections that cause skin disease and blindness. They have developed a sensitive diagnostic test for the parasite that causes elephantiasis.

The second grant will support Well’s effort to understand the development of protective immunity to filarial infections — work that may one day lead to vaccines for preventing filarial infections.

Well and his co-workers have already developed a vaccine that induces partial immunity to filariasis in animals. The team now wants to extend its studies to humans.

For this project, Well’s group will collaborate with researchers at Ain Shams University in Cairo, Egypt. Together, they will study villages near Cairo where filariasis is extremely common. The researchers will study some 300 families to monitor the incidence of new filarial infections.
Focusing Attention

Evidence has been found to suggest that the human brain focuses attention on parts of the body where stimulation is expected by suppressing competing information from other areas of the body.

Researchers report decreased blood flow in parts of the somatosensory cortex in response to anticipated stimulation of various parts of the body. Using positron emission tomography (PET), they studied 37 subjects and found that anticipated stimulation of one part of the body will depress blood flow in areas of the cortex that sense stimulation in other parts of the body.

Principal investigator Wayne C. Drevets, M.D., assistant professor of psychiatry and radiology at the University's Mallinckrodt Institute of Radiology, says the findings support a previous theory of spatial attention which holds that the brain enhances some signals by suppressing competing information.

When study subjects expected stimulation of the finger, blood flow decreased in regions of the cortex that provide sensation to the face. Study subjects anticipating a light touch to the toe displayed decreased blood flow in brain regions that relate to the fingers and face.

Co-investigator Harold Burton, Ph.D., professor of anatomy and neurobiology, says the findings have important clinical implications in diseases where attention is important.

"In some stroke patients there is evidence that attention can be disrupted," Burton says. "If I want to do something with my right hand, then my brain shuts off some activity to my toes and my face. Many stroke patients cannot do that. They have difficulty shifting the focus of their attention."

Drevets says these findings also may play a role in syndromes such as Attention Deficit Disorder.

The Art Of Conversation

Men and women may have different conversational styles, but they use the same parts of the brain to produce words, a new study here shows.

But women may perform difficult language tasks with less effort than men, the research suggests.

The study is the first to compare PET scans of men's and women's brains during language production.

"Our results argue against the idea that men and women tend to use fundamentally different areas of the brain in speech production," says Steven E. Petersen, Ph.D., one of the study's co-authors and an associate professor of neurology.

The research may help settle a long-standing debate about whether men's and women's brains take the same approach to language production.

In the 1970s, the notion crept into the scientific literature that women tend to use both halves of the brain to generate words while men use only the left half.

The brain-mapping study, headed by neurology professor Marcus E. Raichle, M.D., reveals that language production is more complex than previously imagined. Widely separated areas of the cerebral cortex take part, and automatic language tasks, such as reading words, involve different areas than non-automatic tasks.

The findings apply only to language production. It is not yet known whether men's and women's brains differ in the way they handle language comprehension.

To Cut Or Not To Cut

New research shows that a combination of physical therapy, patient education and workplace modification often negates the need for surgery to correct carpal tunnel syndrome, a nerve problem related to repetitive on-the-job tasks.

In a study of 64 patients with cumulative trauma disorders, Susan Mackinnon, M.D., professor of surgery, found that 90 percent said conservative management relieved neck and shoulder pain; 63 percent of these patients reported relief of finger tingling and hand numbness.

In the past two decades, reports of cumulative trauma disorders, such as carpal tunnel syndrome in the wrist, cubital tunnel syndrome in the elbow and thoracic outlet syndrome in the chest and shoulder, have risen. Surgery, the most commonly prescribed treatment, rarely relieves the painful symptoms associated with carpal tunnel syndrome.

Mackinnon's treatment program involved physical therapy to teach patients how to get their muscles back into balance, how to stretch muscles that are tight and strengthen muscles that are weak. Also recommended were modifications of job-specific activities at the workplace or at home and a general fitness program that included aerobic exercise and weight control.
Holograms have been a familiar element of science fiction movies and credit cards for years. Thanks to research at Washington University's Mallinckrodt Institute of Radiology and other institutions, these three-dimensional visions of light someday may be commonplace in hospitals as well.

Robertson points out a fracture in a hologram of the pelvis. Although holograms appear flat in photographs, in reality they are three-dimensional.

OPPOSITE PAGE: Doug Robertson, M.D., Ph.D., hopes that holograms, such as this one of a fractured pelvis, will provide a more realistic view of serious fractures. The computed tomography images to his left are what doctors traditionally use to assess these injuries. The hologram and CT images come from the same patient.

by Juli Leistner
Radion and his colleagues are creating holograms of patients' broken bones to give physicians a startlingly realistic look at serious fractures. Among the possible benefits of this newly applied technology: helping surgeons plan reconstructive surgery of hips and other joints more effectively.

"Holograms are an easy way to display this information. It gives physicians the ability to see the fracture as it really is - in three dimensions," says Robertson, assistant professor of radiology and orthopaedic surgery. Robertson is focusing primarily on pelvic fractures; holograms may be particularly valuable here because fractures of this complicated structure are inherently difficult to visualize with conventional imaging technologies.

When a serious car accident or other trauma leaves a patient with a bad pelvic fracture, physicians traditionally rely on X-rays and computed tomography (CT) exams to pinpoint breaks and decide how best to fix them. But both tests have limitations. X-rays, even when taken from several views, are generally not adequate for assessing damage. CT scans improve the information by providing a series of cross-sectional "bread-slice" pictures through the patient. The flexibility of this format helps physicians see the position of fractures, displaced bones and soft tissue damage more easily.

Still, Robertson explains, "With CT, physicians have to imagine what the fracture looks like as a three-dimensional object. With holograms, that fracture is a three-dimensional object."

Holograms are generated from CT data, using technology developed by a California-based company called Voxel. Currently, the conversion from CT to hologram takes place at the company's facility. Researchers send CT data to Voxel on a computer disk, and Voxel processes it to create holograms. When the film is placed on a special light box, an otherwise hidden image jumps into view. A patient's image, for example, hovers roughly six inches in the air as a luminous, green object. Observers can move from side to side or up and down to look at the sides, top and bottom of the image. Reverse the film on the light box, and the patient appears to have turned around.
Holograms are generated by this complex system of lasers, mirrors and lenses. The system is located at Voxel, the California-based company that developed the technology. (Photo courtesy of Voxel.)

within two days. In the conversion process, CT pictures are projected onto a high-definition cathode ray tube. A complex system of laser cameras, lenses and mirrors transfers CT slice images, one by one, onto the holographic film. The holograph, therefore, displays all of the CT information together in one image.

Roughly half a dozen other medical schools also are studying holograms as a way to display a wide variety of medical information, including vascular exams. "It is possible that we could start overlaying holograms to view lots of different imaging studies together," Robertson says.

Robertson and colleagues at Washington University and The Johns Hopkins University have taken the early steps toward using holograms clinically; in a recent study, they showed that holograms are as accurate as CT for evaluating pelvic fractures. Holograms were better at showing bone fragments and other problems that can be hidden from view on three-dimensional CT images. To make holograms a more practical tool, Voxel is developing a compact device that will allow physicians to generate holograms in their own clinics. Washington University and a few other schools will begin testing the device clinically within the next year.

Holograms probably will not replace conventional CT as the diagnostic gold standard for evaluating pelvic fractures but rather serve as a complementary tool, Robertson says. "We see this as being most valuable for surgeons. It's a nice summary of the information that they can use to plan reconstructive surgeries and even take right into the operating room," he explains. "The implication is that surgeons will be able to do reconstructive surgeries faster and better."
ask John C. Lawrence Jr. Ph.D., why he spent six years chasing after a protein with no known function: "If I'd had to step before an inquisition and defend our work," he says, "I couldn't have done it."

Luckily for Lawrence, the protein proved to be a major league player. It forges a link between insulin, the pancreatic hormone that regulates metabolism, and protein synthesis, which kicks into high gear when insulin contacts cells. The connection came to light when a database linked Lawrence, who is an associate professor of molecular biology and pharmacology, with a Canadian biochemist.

Cells are constantly bombarded with signals from hormones, growth factors and other molecules, and they may respond by altering the activities of their genes or proteins. Scientists have known for 20 years of a pathway between the insulin signal and the intracellular site of protein synthesis, but they did not know how the two were linked.

Like many signaling molecules, insulin communicates with cells by binding to a receptor on the cell surface, like a key fitting into a lock. This triggers a chain of events that adds phosphate groups to several proteins. After insulin-stimulated phosphorylation was discovered in the mid-1970s, scientists thought they "only had to find out what these proteins were and they would know what insulin was doing," says Lawrence, who had just begun working on insulin at that time as a pharmacology doctoral student at the University of Virginia.

Several phosphorylated proteins later, no function had been found, and interest in the approach waned. But in 1988, seven years after Lawrence came to Washington University, he re-opened the search. "It wasn't a unique idea," he says. "It's just that we were the only ones who were crazy enough to do it."

The PHAS-I Sequence

Since Lawrence had no idea which protein might be important, he chose a robust one that survived boiling and acid treatment. Ignorant of its function, he named it PHAS-I, meaning phosphorylated, heat- and acid-stable protein.

It took Lawrence six stop and start years to purify PHAS-I from fat cells, which are exquisitely sensitive to insulin. "For a biochemist, the rat adipocyte would be one of the worst places to purify a protein from, because it is 95 percent fat," he explains. "So, we would do these big preparations and get vanishingly small amounts of protein that would disappear."

Supported by grants from the Juvenile Diabetes Foundation and the National Institutes of Health, Lawrence and research technician Jimmy Kong eventually obtained enough material to analyze part of the protein's amino acid sequence. This enabled postdoctoral fellow Chaobin Hu, Ph.D., to isolate DNA copies (complementary DNA, or cDNA) of the messenger RNA that coded for this sequence, a procedure known as cloning. Lawrence then determined the nucleotide sequence of the cDNA and deduced the corresponding amino acid sequence of the entire PHAS-I protein. An April 1994 paper in Proceedings of the National Academy of Sciences outlined his findings.

Lawrence had been searching for similar sequences in GenBank, a computerized database of protein sequences in Bethesda MD. He hoped a related protein would clue him in to PHAS-I's action. He placed his own sequence in GenBank on January 12,
1994. "But PHAS-I wasn't homologous to anything," Lawrence recalls. "So we said, 'Did we waste all this time? Not only does the phosphorylation of PHAS-I have no known function, but we don't even know what the protein is.'"

After preparing antibodies to PHAS-I, Lawrence detected the protein in a wide variety of tissues, finding the highest concentrations in fat and skeletal muscle cells, which are very responsive to insulin. And the immunochemically detectable protein became phosphorylated when cells were exposed to insulin or various growth factors. "So we knew we were onto something," Lawrence says. "We hadn't purified a protein that was only involved in fat metabolism, for example. It appeared to be more generally involved in the biology of the cell."

Recombinant PHAS-I, prepared by expressing the cDNA in bacteria, proved to be an excellent substance for MAP kinase to act on. The enzyme helps transfer signals from many hormones and is dramatically stimulated by insulin in fat cells. Although PHAS-I has several phosphorylation sites, the kinase acted on one that responds to the insulin signal. Therefore, PHAS-I looked as if it could be a major substrate for MAP kinase in the cell, qualifying it for a role in the transduction of signals from insulin and other stimuli. In a September 1994 paper in the Journal of Biological Chemistry, Lawrence's team said that, "It seems reasonable to believe that MAP kinase mediates the insulin-stimulated phosphorylation of PHAS-I."

The Canadian Connection
Meanwhile, at McGill University in Montreal, Arnim Pause, a graduate student of biochemistry professor Nahum Sonenberg, Ph.D., had been looking in GenBank every few days. The two were hoping to find a nucleotide sequence matching that of a cDNA they had cloned from a human cDNA library. The cloned DNA encoded a protein that bound to cAMP from many hormones and is dramatically stimulated by insulin in fat cells. Although PHAS-I has several phosphorylation sites, the kinase acted on one that responds to the insulin signal. Therefore, PHAS-I looked as if it could be a major substrate for MAP kinase in the cell, qualifying it for a role in the transduction of signals from insulin and other stimuli. In a September 1994 paper in the Journal of Biological Chemistry, Lawrence's team said that, "It seems reasonable to believe that MAP kinase mediates the insulin-stimulated phosphorylation of PHAS-I."

How insulin may stimulate protein synthesis: 4E bound to PHAS-I is released when a signal from insulin causes PHAS-I to become phosphorylated. The complex that 4E then forms with other initiation factors enables ribosomes to begin synthesizing new proteins.
4E recognizes a methylated structure, called a cap, which sits at the beginning of messenger RNA molecules. With the other initiation factors, it attaches the messenger to a ribosome, bringing together the blueprint for protein synthesis and the protein synthesizing machinery.

Sonenberg discovered that his purified 4E-binding protein inhibited protein synthesis in the test tube. Puzzled, he asked himself, “What does this mean? Why would one want to inhibit translation?”

Wondering if the 4E-binding protein had a significant function in cells or was just an artifact, Sonenberg turned to GenBank for inspiration. When Lawrence’s sequence appeared, he found the long-awaited match — human 4E-binding protein and rat PHAS-I were 93 percent homologous. So Sonenberg and Lawrence had been looking at their similar proteins from opposite ends of the same intracellular pathway — Lawrence from the insulin signal and Sonenberg from the initiation of translation. “It was very exciting,” Sonenberg says, “because Lawrence’s work suggested that our protein was a major target for insulin. We knew this was very important.”

Sonenberg knew little about insulin, but serendipity stepped in. Looking through citations from Lawrence, Pause and Sonenberg saw the name G. J. Belsham on a 1981 paper. As a graduate student at the University of Bristol, England, Graham Belsham had detected the phosphorylated protein that later became PHAS-I. “That couldn’t be our Belsham?” Sonenberg asked, referring to a virologist who was spending a sabbatical in his lab. Belsham was not at home that Saturday, but he revealed his past the next day. “So he knew exactly which experiments we would have to do,” Sonenberg recalls.

Lawrence was still puzzling over the function of PHAS-I when Sonenberg called him on the phone. “It was a match made in the database,” Lawrence quips. Sidestepping territorial disputes, the two agreed to work toward two joint publications. After Lawrence sent antibodies to PHAS-I to Montreal and Sonenberg sent antibodies to 4E to St. Louis, the collaborators tested their hypothesis: PHAS-I and 4E-binding protein are versions of a molecule that holds onto 4E, like a dog clamping a ball in its jaws, and then drops the factor when it (the binding protein) becomes phosphorylated in response to the insulin signal. 4E is then free to enter into the complex that initiates the translation of messenger RNA, stimulating protein synthesis.

The Collaborative PHAS

Evidence presented in the journals Nature and Science on two consecutive days last October strongly supports this interpretation. Using several approaches, the researchers confirmed that their new proteins did interact with 4E. For example, Lawrence’s antibodies to PHAS-I immunoprecipitated a newly translated mixture of PHAS-I and 4E but did not precipitate 4E alone.

Extracts of insulin-treated fat cells contained lower levels of the complex between 4E and 4E-binding protein (PHAS-I) than cells that had not been exposed to insulin. But when both extracts were treated with an enzyme that removes phosphate groups, the levels were comparable.
The October 27 paper in *Nature* concluded that the phosphorylation of 4E-binding protein in response to insulin exposure causes the binding protein to dissociate from 4E "indicating that this may account for the enhanced translation activity in adipose tissue upon insulin treatment."

The researchers also showed that phosphorylation by MAP kinase affects the binding of PHAS-I to 4E. When postdoctoral fellow Tai-An Lin, Ph.D., poured extracts of untreated fat cells through columns of PHAS-I bound to resin, he observed very little binding of 4E, suggesting that the initiation factor was not freely available in unstimulated cells. After he exposed cells to insulin, the amount of free 4E increased, as measured by binding to the column. But the 4E in extracts of insulin-treated cells did not bind well in columns made with PHAS-I that had been phosphorylated with MAP kinase.

In light of this and other experiments, the October 28 *Science* paper concluded that activation of MAP kinase in response to insulin increases the phosphorylation of PHAS-I, which then releases 4E, allowing the initiation of translation to proceed.

“So this clarified an important aspect of insulin action,” Sonenberg says. “Now we have the previously missing link between the translation apparatus and the signal transduction pathway that is stimulated by growth factors and hormones.”

Ongoing work shows that certain growth factors that signal via MAP kinase also stimulate protein synthesis through the link between 4E-binding protein (PHAS-I) and 4E. “So it’s more general than insulin,” Lawrence says. “Here’s a new general mechanism by which growth factors and hormones can regulate protein synthesis in all cells — at a critical step that is usually rate limiting. That’s why it’s so exciting.”

**A Dimmer Switch**

The fine tuning of metabolism involves a complex set of checks and balances that allows the body to balance its need to synthesize new materials with its need to burn molecular fuels. Whereas Lawrence’s work with PHAS-I showed how insulin can stimulate protein synthesis, one of his 1993 papers revealed how the MAP kinase pathway can be turned down.

The project involved Bradley Sevetson, a research technician who is now a graduate student at the School of Medicine. He and Lawrence found that increasing the intracellular concentration of a small molecule called cyclic AMP (cAMP) decreased MAP kinase’s ability to phosphorylate other proteins. This effect inhibited the activation of MAP kinase by insulin and several growth factors. Other researchers showed that cAMP blocks the MAP kinase pathway near a protein called Ras, whose overproduction can transform cells.

The cAMP story partly explains how epinephrine, a small molecule from the adrenal gland that helps the body respond to stress and exercise, can attenuate the effects of insulin. Whereas insulin and various growth factors activate the MAP kinase pathway, epinephrine raises cAMP levels, damping the flow of signals. The finding also has more general implications. “It has been known for more than 20 years that adding cAMP derivatives to transformed cells causes a reversion to the normal phenotype,” Lawrence explains. “So awareness of the cAMP inhibitory pathway may lead to insights into the control of cell growth and cell transformation.”
If the schedule holds, Washington University’s official spring Commencement will include one particularly notable graduate.

Like all seniors, he has lived with the school at his life’s center, but for a longer time and with a greater devotion than any of them, no matter how deeply immersed in their educations they became.
Characteristic attentiveness shows what many who work closely with him say is one of Danforth's greatest strengths: an ability to listen.

"I'm not retiring, I'm graduating," says William H. Danforth, M.D., departing after serving as chancellor of the University for 24 years. "Like many seniors, right now I'm not sure what I'll do next. Maybe I'll get a real job, or go to graduate school. Maybe I'll just hang out for a while."

Those comments communicate a particularly Danforthian way of thinking about the University. Perhaps he hasn't considered the chancellor's position to be a "real job" because it has suited him so close to perfectly. Instead of doing the job, he has lived it.

"He is totally devoted to the institution," says William A. Peck, M.D., executive vice chancellor for medical affairs and dean of the School of Medicine. "He and Ibby (Mrs. Danforth) have given of themselves immeasurably, and always with requisite thoughtfulness, sensitivity and grace."

"He has a commitment to, a tolerance for and an interest in all of the duties that go with the role of chancellor," says Samuel B. Guze, M.D., head of the Department of Psychiatry and the former vice chancellor for medical affairs who succeeded Danforth in that position.

According to Robert J. Glaser, M.D., "Chancellor Danforth's dedication to the University and its place in higher education is absolute. He relates to all of the University's constituents — students, faculty, trustees, alumni." Glaser, who first met Danforth when he interviewed the future chancellor for an internship in medicine at Barnes Hospital, has been a trustee of the University since 1979 and chairs the School of Medicine's National Council.

On many occasions, Danforth has spoken of the University as a place where the best ideas are preserved beyond the term of a single life, a repository of ideals, such as leading a worthwhile existence. He says, "I bought in early to the ideals of Washington University. They suited me. I have tried to understand them."

If he has shared the University's ideals, he and Ibby also have worked hard to keep them prominent for the community and the world to see. Danforth's preference is to spend his time on big ideas. He speaks easily of weighty issues that other people find intimidating or uncomfortable.

"He does not respond to small talk," says M. Kenton King, M.D., former dean of the School of Medicine and one of those with whom Danforth has worked most closely. "Tell him a joke and you may notice that the conversation has turned to the resolution of world hunger. He wants the world to be a better place, and he regrets people who make it a worse place."
He is a good, careful listener. I always get a good feeling in his presence because he gives off a warmth without being overly warm,” says Peck. Adds Guze, “People take seriously anything he says, so he’s careful about all that he says.”

Danforth recognizes the proclivity. “One of my roles has been to do my best to understand important issues, to look beyond the horizon. It has been easier to do here than at some other places, because the University is home to people with wonderfully broad perspectives,” he says.

For example, Danforth comments on the importance of civility, a subtle and all too easily trampled value: “This University, he disagrees that he has served as the embodiment of the institution, as he has been called. “It was here before me, and it will be here after me. The culture is made by the faculty and the students. The administration just helps a little.”

And, in spite of work weeks that often include all seven days and as many as 14 hours per day, Danforth maintains that his has been “the greatest job in the world.” Challenged over his assertion that it “always has been fun,” he insists that he means precisely that. He has enjoyed every moment, even on those occasions — described by King — when he has been expected at three dinner functions on the same evening, enjoying appetizers at one, an entree at the second and dessert at the third.

In another role, he has served as paterfamilias to the University community, particularly to its youngest constituents. Reading Thurber to freshmen students in the dorms is in

On March 15, 1994, Chancellor Danforth and William A. Peck, M.D., executive vice chancellor for medical affairs and dean of the School of Medicine, welcomed First Lady Hillary Rodham Clinton to the campus. Mrs. Clinton presented a major public address on healthcare reform.
Bill Danforth is soft-spoken, thoughtful and careful,” says Samuel B. Guze, M.D., qualities apparent in this pensive study.

"Bill Danforth is soft-spoken, thoughtful and careful," says Samuel B. Guze, M.D., qualities apparent in this pensive study.

no way “Pollyanna-ish,” Guze says. “Others may go to football games because it’s the thing to do, but they don’t go with the enthusiasm and unflagging interest of Bill Danforth.”

His more ceremonial roles aside, Danforth also has been one of the nation’s most effective and respected academic leaders. “The real job is to worry about the University,” he says.

According to colleagues, he worries, but he also acts. “He is an extraordinarily intelligent individual with no weaknesses as a thinker and an incredible capacity for work,” says Peck.

Adds Guze, “Everything the University has done that required community support took advantage of his help. It is a rare university that is fortunate to have a leader who knows his community as well as Bill Danforth knows St. Louis. His prominence, his wealth and his contact with community leaders give him a great advantage. The family connections were his entree, but it was his personal performance that won them entirely.”

“He has the trust of the St. Louis establishment,” adds King. “He came up as a friend of board members. And he developed a very close relationship with Mr. McDonnell. Still, his accomplishments are his own.”

During his tenure, Danforth has overseen the growth of the University into one of the nation’s finest. Applications to undergraduate school are up more than 50 percent, and the endowment has soared from $147 million to $1.72 billion, partly as a result of the $630 million “Alliance for Washington University” capital campaign. On his watch, almost 60,000 degrees have been granted, and 10 Nobel laureates and two Pulitzer prize winners have been named from the University. More than 70 named chairs were created on the two campuses during the Danforth years; only 40 in the previous 114 years.

“He is particularly persuasive in developing resources, but there’s never a lot of folderol. His sincerity always shines through,” says Glaser.

Danforth came to the chancellor’s job from the School of Medicine, where he first worked in the famous laboratory of Carl Cori, investigating glycogen metabolism. He jokes that Cori, committed wholeheartedly to science, once kidded him, “I didn’t raise you to be a chancellor.”

The preparation that the lab and further experience as vice chancellor for medical affairs provided has served him well. “That was a good ground in which to grow future administrators; Dave Kipnis came from that department and so did Roy Vagelos, who went on to head Merck,” he points out.

Danforth assumed the relatively new position of vice chancellor for medical affairs in 1965, after Carl Moore had held it for one year. His first feat was to resolve a hospital/medical school conflict, which King reports he managed in short order.

Originally defined as a half-time position, the job then began to “take up more and more time,” Danforth says.
The year was 1964 — prior to Danforth's change from medicine to administration — when he demonstrated a piece of that day's medical equipment. "I'd have to go back to school in order to go back to medicine," he says.

During his oversight of the medical school, the McDonnell Medical Sciences Building tripled the school's laboratory space. King recalls that the creation of the building also cemented the developing trust between Danforth and the McDonnell family.

Together with Roy Vagelos and Max Cowan, King says, Danforth was instrumental in establishing the Division of Biology and Biomedical Sciences, tying the medical school's strength to the Hilltop Campus and foreseeing a major trend in scientific education. "It would never have happened without Danforth," King says.

After six years in the vice chancellor's post, Danforth moved on to the chancellor's office, and Guze took over the vice chancellor's job. Even considering the longer view from the chancellor's office, Danforth never forgot the medical school.

"He has been a great supporter of the medical school, but not to a fault. The balance has always been appropriate, and that's not easy," says Peck. Adds Guze, "He has maintained a conviction of the importance of research, and has been easy to talk to about academic issues." Pointing to the Clinical Sciences Research Building as tangible proof, King adds that Danforth's early connection to the medical school has made him more apt to care about it than other chancellors might, but that, "Bill is of a big enough stature to speak for the whole University."

Danforth maintains an abiding interest in basic science and the pursuit of truth. And he holds the work in the highest regard. He says of the Medical Campus: "I am still inspired when I hear what people at the Medical Center are doing, the research and teaching and patient care. It is truly the pinnacle of human achievement, and I feel very lucky to be associated."

His experiences at the Medical Center taught him three things, Danforth says: "First, as a physician I learned that you can't call your time your own. And I worked with all sorts of people, many of them under difficult stress, so I learned a lot about my fellow humans. And I saw that the medical school is a great place, with high standards and expectations. It has always inspired me."

By comparing those early experiences with his later work, he also came to understand the advantage that physicians have over many other professionals. "Doctors have a common goal; disease is the common enemy. They may disagree about how to proceed, but not about their goals. In administration, people argue about the goals as well as how to proceed, where to head as well as how to get there," he says.

Would Danforth consider a return to the practice of medicine? "I'd have to go back to school in order to go back to medicine. I've been away too long," he says.

Recalling the day 24 years ago that was his first in the chancellor's office, he says he was not intimidated by the post. "I was probably more self-confident than I had a right to be," he says. And what does he anticipate for his last day in the Brookings office? He says, "Oh, I'll be packing up, getting ready to move. I've been here so long that it may take some time to do the chores."

On that day, the University will graduate one of its linchpins, a leader by example with the uncommon capacity to combine immense vision with sincere concern for the individual. As Guze says, "We won't find another Bill Danforth. We'll be tempted to look, but we have to find a person with a different set of qualities that can move the institution forward."

Danforth, who always has counseled that change should be welcomed, has his own thoughts: "I am leaving my successor with plenty to do. The University must change in the next five years or we will be in trouble. There are many challenges on both campuses. They need to be addressed."

"
By stimulating the body's natural production of blood cells and practicing blood conservation strategies, researchers here are working toward the day when blood transfusions — and the risks and fears they create — no longer will be necessary.

Fear of infection, particularly HIV, is one compelling reason why researchers are seeking ways to minimize or eliminate blood transfusions.

"Patient perception is that blood is dangerous," says Terri G. Monk, M.D., associate professor of anesthesiology. "They are very concerned about exposure to allogeneic blood, blood from another person. That's true in almost every patient scheduled for elective surgery."

But patient perception does not reflect reality, according to Lawrence T. Goodnough, M.D., who says statistically the blood supply is safer now than ever before.

"The risk of post-transfusion AIDS is approximately one in 200,000, and the risk of post-transfusion hepatitis is approximately one in 3,000," says Goodnough, who is associate professor of medicine and pathology and director of transfusion services at Barnes Hospital.

Monk and Goodnough are investigating several methods they hope will reduce the risk of exposure to allogeneic blood. They have found that by giving recombinant human erythropoietin to patients in the weeks prior to their radical prostate surgery they can "jump start" blood production and raise hematocrit levels, the measurement of the volume of packed red cells in a blood specimen.

The hormone is given before patients have a chance to become anemic to stimulate production of red blood cells when oxygen levels dip too low. "We know they will lose blood during surgery," Goodnough says. "When you are planning ahead for surgery, you want to stimulate blood production before anemia. We know that a patient's own, endogenous erythropoietin will eventually kick in, but it won't be in time to avoid a blood transfusion."

Once secreted, the hormone travels to the bone marrow, where it comes into contact with blood precursors. The erythropoietin at-
taches to the precursors and stimulates the production of red blood cells, enabling the body to replenish its blood supply, maintain circulation and provide adequate oxygen to its various organ systems.

Researchers purified erythropoietin in the mid-1970s. A recombinant DNA product followed in the 1980s. It was first given to patients with renal failure, but its uses have expanded to include patients with anemias related to HIV infection, cancer and cancer treatment, and most recently, in patients with anemia following surgery.

Because the drug is identical to the human hormone, there are few side effects. Patients are monitored to ensure that their blood does not become too thick, but if their hematocrit rises too high, the excess can be donated and stored in the blood bank.

"It's a very promising technique," Goodnough says. "As long as you have some time to plan ahead, you have time to put a patient on erythropoietin."

Combining Therapies

Erythropoietin works well when used with a technique called acute normovolemic hemodilution (ANH). This procedure involves drawing up to four or more units of the patient's blood either just before or immediately after the induction of anesthesia.

Removing a patient's blood just before surgical bleeding seems an unusual strategy, but using ANH, Goodnough and Monk are radically reducing the need for allogeneic blood.

As blood is removed, the patient's circulation is maintained with intravenous saline solutions. These solutions keep the blood volume constant. The patient's vital signs and blood oxygen levels are closely monitored.

With hemodilution, as much as half of the liquid in the bloodstream is saline, so blood lost during surgical bleeding contains fewer red blood cells and less oxygen-carrying hemoglobin. Because the blood remains in the operating suite at room temperature, platelet and clotting function remain intact. White blood cell function also is preserved, because the blood is not refrigerated and is returned to the patient only three to four hours after it is drawn.

ANH eliminates waste and lessens the need for allogeneic blood. The technique is also much less expensive than pre-operative autologous blood donation, which has been the standard of care in patients up to this time.

With autologous blood donation, patients donate their own blood, and it is stored during the weeks prior to surgery. Because the patient's blood is available for transfusion, risks attached to exposure to allogeneic blood are reduced.

One problem with this method is that special handling requirements make it expensive. In a study comparing the techniques, Goodnough and Monk found that predonated autologous blood costs an average of $105 per unit compared with $18 per unit using ANH. "Rather than just taking a unit of O positive from the blood bank," Monk explains, "you've got to make sure that it's O positive from a particular patient. That makes it harder to inventory."

The blood must be stored and tested, and it is sometimes wasted.

"You collect as much blood as you can to avoid allogeneic blood exposure," says Goodnough. "Most patients lose smaller volumes of blood than are collected, and we only return the blood when the patient loses enough to hit a transfusion trigger. As a result, we waste an average of 40 to 50 percent."
Limiting Transfusions

In addition to pre-operative donation of autologous blood, investigators are lowering exposure to allogenic blood by transfusing patients less often. Clinical research has shown that patients do well with less blood. Researchers have learned that the ratio of red blood cells per volume of whole blood can fall to a much lower level than was once considered safe. There is still a red cell count beyond which patients are not allowed to fall, but that level is significantly lower than it once was.

"To some extent, patients were over-transfused in the past," Goodnough says. "Blood safety concerns have made us more conservative in our transfusion practices."

Researchers also have developed blood conservation and blood salvage techniques that lower exposure to allogenic blood. During surgery, blood is collected from the operative field, packed and returned to the patient. In some orthopaedic patients, blood that drains from a wound is collected and returned to the patient. Those techniques, while useful, don't usually provide enough blood to satisfy blood needs.

Monk and Goodnough are studying blood substitutes, such as bovine hemoglobin, as experimental treatments. The molecule is similar to human hemoglobin, so the immune system does not immediately recognize it as different. Plus, the bovine hemoglobin has been removed from the red blood cell. That is important because the cell membrane has blood group antigens that could kick off an immune response. In preclinical trials, the bovine product was administered many times to the same individuals, and while some did form antibodies, there were no adverse clinical effects.

The limitation of blood substitutes is that they disappear over time. "They circulate for 12 to 24 hours, depending upon the dosage and the administration," Goodnough says. "But that is the window of time when they're effective, and you can build on that with hemodilution and recombinant human erythropoietin."

"Some of these techniques may not be appropriate for emergency surgery, and those patients will always need allogenic blood," Monk says. "But if you have time to plan, they can contribute to lowering the need for transfusion."

Many of the methods used to limit exposure to allogenic blood seem to be working. "We have done a review," Monk explains, "and found that prior to 1992, in patients undergoing radical prostatectomy who did not pre-donate any blood, there was a 70 percent incidence of allogenic blood exposure. Now, only about 10 to 15 percent of patients get blood from the blood bank."

In spite of their success, the investigators don't plan to stop. "The goal is bloodless surgery," says Goodnough. "We want to eliminate any exposure to allogenic blood."

"We probably won't ever achieve that goal completely," Monk says, "but I am optimistic that in the next few years we'll lower the chance of exposure to allogenic blood to 1 or 2 percent."
An Idea With Resonance

by Kraig Kirkpatrick

A second-year medical student, relatively new to the hospital environment, I was somewhat bewildered when I had my first encounter with manual chest percussion. Whack, whack, whack, I heard. The harsh pounding sound piqued my curiosity, so I followed it to a room at the end of the hall. There, I saw a respiratory therapist, with sleeves rolled up, repeatedly hitting a patient on the back. I quickly fled. Was the patient non-compliant with his medications? Did he forget to pay his bill? What type of transgression could possibly warrant this type of physical abuse?

After describing the scene to the chief resident, I learned the therapist was not beating the patient but performing a standard medical treatment called manual chest percussion.

By rhythmically striking the back of the patient, who suffered from cystic fibrosis, the therapist was trying to help clear small airways that can become blocked due to abnormal production of pulmonary secretions caused by disease, the resident said. Blocked lungs are vulnerable to infection, inflammation and even severe tissue destruction.

This was my introduction to manual chest percussion, a procedure widely used in the management of many disease processes including cystic fibrosis and postoperative lung collapse.

Manual chest percussion is a two-step process that is performed by a trained therapist in the hospital, but also can be done at home by mechanically agitate the excess pulmonary secretions and promote drainage.

Although the technique is very effective, I found it had several drawbacks. One is that it is expensive for a hospital to use highly trained therapists for such a time-consuming task; e.g., one hospital patient typically requires four treatments a day. Each patient takes up about four hours of a therapist's time.

Another drawback is the loss of independence patients at home suffer because they require treatments twice a day, and they need someone who can perform the procedure. Finally, some patients who are elderly or obese may receive little or no benefit because the technique is either ineffective or dangerous. In very large individuals with thick chest walls, the amount of energy that reaches the airways is reduced, and the treatment's effectiveness is limited. Many geriatric patients are too frail to withstand the physical pounding associated with the technique.

There have been several attempts to replace manual percussive therapy with automated methods such as hand-held vibrators and compression vests. Although these methods can be performed at home by the patient, granting them greater...
autonomy, they don't provide sufficient penetration (energy applied at the chest wall fails to penetrate to centrally located airways in large to obese individuals) and they can be expensive (a compression vest costs approximately $25,000).

Two years ago, I started thinking about possible alternatives to manual chest percussion, and I thought, why not try sound. Sound has been proven to safely penetrate even abnormally thick adipose tissues. Growing up in the NASA environment sparked a fascination in physics that I have maintained throughout my life. My adviser directed me to the right people at the medical school who helped me organize a research project to investigate sound as an alternative to manual chest percussion.

The sonic percussion research project I developed is an attempt to replace manual chest percussion with an automated system based on sound energy. The hope is that the system will maintain the benefits of manual percussion and eliminate many of its detractors.

Sound is a form of wave energy that is described according to its wavelength, which determines its frequency (measured in Hertz). The human ear can detect frequencies ranging from 20 to 20,000 Hz. Sounds within this range are sonic waves and sounds above this range are ultrasonic waves. Most medical applications of sound energy use waves in the ultrasonic range, such as diagnostic ultrasound, which is used to image structures inside of the body (such as a fetus during pregnancy), and lithotripsy, which can be used to pulverize kidney or gallbladder stones. My research uses sound in the sonic range to produce a phenomenon called resonance.

Every object has a frequency at which it resonates. When wave energy is applied to an object at its resonant frequency, the energy of the individual waves becomes additive and generates a much greater effect on the object than individual waves would be capable of. This is why military columns do not march in step across a bridge, for fear of collapsing the bridge. It also explains how a few opera singers can shatter crystal goblets.

My research into sonic percussion is based on replacing the airway vibrations achieved with manual chest percussion with vibrations achieved through sound-induced resonance of the airways.

The research project is being conducted in four phases. Phase I was an academic research phase in which we searched the literature for similar work that had been conducted. A detailed safety profile of a hypothetical prototype was constructed and an application was submitted for human trials with adult cystic fibrosis patients. Phase II was dedicated to the design and construction of the prototype. Both Phase I and Phase II were conducted under the mentorship of Michel Ter-Pogossian, Ph.D., professor of radiology.

The prototype device is designed so that the patient lies between two speakers which can be positioned next to the anterior and posterior of his or her thorax. After adjusting the speakers to fit the patient's body, the amplitude and frequency of the emitted sound are adjusted until the Dalek effect is achieved. The Dalek effect is an audible quivering in the voice that occurs when the airways vibrate (either from resonance or from the physical striking associated with manual percussion).

Currently, we are in the third phase of the research project, which will compare the effectiveness of sonic percussion with manual percussion through human trials. Phase III is being conducted under the mentorship of Marin Kollef, M.D., assistant professor of medicine and director of critical care medicine and of respiratory care services. The study is a randomized, prospective crossover study in which sputum analysis and pulmonary function tests will be used to compare the two modalities.

Preliminary results indicate there is no statistically significant difference between the effectiveness of manual chest percussion and sonic percussion. An abstract detailing these findings was recently accepted by the The American Thoracic Society for publication in the American Journal of Respiratory and Critical Care Medicine. We will continue to enroll patients in the study through May 1995, when all results will be presented at the American Thoracic Society's International Convention in Seattle W.A.

If results of the pilot study are promising, we will continue with Phase IV, which would include further research on a more portable sonic percussion device.

Editor's Note: Kraig Kirkpatrick is a fourth-year student at the School of Medicine from Kansas City MO.
AFTER serving as team physician to the St. Louis Blues for 27 years, Jerome J. Gilden, M.D., now orthopaedic surgeon emeritus to the hockey club, is attending games in the abbreviated 1994-95 season as an ordinary fan. Gilden, chief of the Department of Orthopaedic Surgery at The Jewish Hospital of St. Louis, speaks warmly of his years with the team. A lengthy list of his professional accomplishments, however, demonstrates clearly that the practice of sports medicine has been only one facet of a prolific career.

All but three years of his career have been spent in St. Louis. Gilden entered private practice in 1958, at the same time becoming an active staff member at Jewish Hospital, a long-standing relationship he maintains to this day.

It was through his association with Jewish Hospital colleague Jacob G. Probstein, M.D., that Gilden was brought into the Blues fold after the club's emergence in 1967 as a National Hockey League expansion team. Probstein, the team's original doctor, called Gilden in during the first week of the club's first season to look at a player's knee injury. Gilden eventually succeeded Probstein as the team's lead physician, going on to serve as chief of the team's panel of doctors for more than 20 years. "Initially I took care of everything — the fans, our team, their team — but we realized that when the Blues incurred injuries, Gilden's medical ministering of the team ran the gamut, from minor sutures stitched during games — sometimes sans anesthetic — to major orthopaedic surgeries. One of his most challenging cases, remnant in the minds of allegiant fans even today, was defenseman Noel Picard's fall from a horse that shattered his foot in the early 1970s. Though everyone, including his doctors, felt Picard might never skate again, he returned to the ice and the team less than a year after Gilden performed the surgery that set his broken bones in place.

Paramount to Gilden was regard for the long-term health of the team's members. Though early rehabilitation is an important aspect of sports medicine, it cannot be achieved at the expense of the players, he says. In his many years with the team, Blues management supported Gilden in this view, setting the stage for a successful coexistence between medicine and an injury-riddled sport.

Concern for individuals and the problems they face has been a constant throughout Gilden's career. In January, he celebrated the 37th anniversary of his private practice. Through the years he has witnessed
major changes in both the technology of his chosen specialty and in the social and economic structure of the field of medicine.

Gilden earned his undergraduate degree at Washington University in 1948 and his M.D. in 1952 at the School of Medicine. After completing an internship at Jewish Hospital and a general surgery residency at Jewish and then-St. Louis City Hospital, he undertook a three-year orthopaedic surgery residency at the University of Cincinnati. A native St. Louisan, he and his wife, Annette, returned to St. Louis to raise their family.

Fresh out of residency, Gilden was trained in trauma, back surgery and spine, hip and knee reconstruction. In those days, he also worked with polio patients. With the advent of joint replacement therapies around 1970, orthopaedic surgery began to change dramatically. Gilden, like many others in his field, began to subspecialize.

“We were generalists,” says Gilden of his early days as a physician, noting that there were no subspecialties as there are today, “but as time went on, you realized that you couldn’t keep up with the latest state of the art in everything.”

Gilden not only survived the innovations that occurred within orthopaedic surgery, he routinely developed and promoted them. He was the first orthopaedic surgeon in the St. Louis metropolitan area and the Midwest to perform knee replacements and was among the region’s leaders in doing total hip replacements. Though he no longer performs surgery, his work focuses on knee and hip reconstructions and replacements, fracture trauma and medical back care.

Specialization, realized largely in conjunction with fellowship training programs, is instrumental in helping young doctors develop particular areas of medical expertise, says Gilden. Current political feeling that there are “too many” specialists is a reaction to “having gone to the ultimate limits of superspecialization,” he says.

“There still will be specialization within our field, because the amount of knowledge is so vast that to be at the cutting edge, one really has to be focused,” asserts Gilden. And though he agrees there is a need for more good primary physicians, he believes the current movement away from specialization may backfire. “I think society will find itself not being pleased with some of the care.” The idea that a gatekeeper or primary physician can understand the whole field is not going to work out ultimately.

“What we tell the young people is, ‘Continue to do the best job you can and pursue your interests to the best of your ability.’ I think that excellence will win out in the long run — society will certainly want to choose that individual who does the best job, gives the best service and is the most user-friendly.”

One of the capacities in which Gilden talks to young doctors is as an assistant professor of orthopaedic surgery at the School of Medicine, where he instructs residents and interns in the operating room. Along with his teaching duties, he has served in a number of administrative positions during his years at Jewish, including a term as president of the Medical Staff Association and as a member of both its medical executive committee and board of directors. He also directs the hospital’s Medical Program for the Performing Arts for musicians and dancers.

His contributions do not stop at the hospital, however. Long active in community service through his work with the Jewish Community Center Association (JCCA), he has served on its boards of directors and trustees and as chairman of the group’s medical advisory and older adults committees.

“I get involved in so many things, it’s hard to know where to stop and start,” says Gilden. “I started out at one time to be a social worker — my wife and friends say I’m still a social worker at heart.” That initial desire to do good works, manifested in a lengthy medical career, continues to infuse Gilden’s spirit.

“I’m one of those people who feel that you have to set ideals, even though you can’t carry them out letter for letter,” says Gilden. “We have to reinsert idealism — something to strive for — even though reality does hit us.”

“I get involved in so many things, it’s hard to know where to stop and start. I started out at one time to be a social worker — my wife and friends say I’m still a social worker at heart.”
Rappaport Tapped For National Council

ALLAN H. Rappaport, M.D., '72, J.D., has joined the School of Medicine's National Council.

Allan Rappaport, M.D.

Rappaport is the founder and chairman of National Emergency Services Inc., headquartered in Tiburon, CA, the nation's largest provider of emergency room services. His company, with six regional offices and 250 employees worldwide, is responsible for all operations involved in staffing more than 300 hospitals and military facilities in the United States, Europe and Central America.

"My education as a medical student at Washington University has meant a great deal to me," says Rappaport. "I look forward to serving on the National Council and giving something back to the School of Medicine. With over 20 years of experience in a closely related field of business, I hope I can provide a useful perspective on medicine at this challenging time."

The National Council comprises prominent men and women from a broad assortment of endeavors to assist William A. Peck, M.D., executive vice chancellor and dean, in steering the school. The council meets twice each year.

New Distinguished Alumni Scholarship Honorees Named

FOUR alumni have been chosen this year as honorees for the Distinguished Alumni Scholarship Program in recognition of their contributions to teaching and students. They are: Allan E. Kolker, M.D. '57, professor of ophthalmology; Barbara S. Monsees, M.D. '75, associate professor of radiology; Robert C. Packman, M.D. '56, clinical professor of medicine; and Gordon J. Philpot, M.D. '61, Harry Edison Professor of Surgery.

The Distinguished Alumni Scholarship Program is the school's major merit scholarship. Funded through annual gifts from alumni, former residents and friends, along with grants from the school, the program provides four-year, full-tuition scholarships to 16 outstanding medical students each year.

Reunion Speakers Chosen

DAVID W. Orthals, M.D., president of the Washington University Medical Center Alumni Association, has recruited 10 speakers for the Reunion '95 Scientific Program. They are:

- Dennis P. Cantwell, M.D. '65
- S. Bruce Dowton, M.D.
- Bradley Ewanoff, M.D. '86
- Stephen A. Kamersky, M.D. '70
- Phillip E. Korenblat, M.D.
- Barbara S. Monsees, M.D. '75
- William Powderly, M.D.
- Gustav Schonfeld, M.D. '60
- William Shearer, M.D. '70, Ph.D.
- Arnold W. Strauss, M.D. '70

Continuing medical education credit will be available for those attending.

Focus on Former House Staff and Fellows

NEARLY 1,000 former house staff and fellows responded to a questionnaire sent by the Alumni Office asking them about their accomplishments and for their opinions on the training they received here. Some 5,800 questionnaires were mailed in mid-December 1994, and responses are still coming in. About 600 were returned with undeliverable addresses. (If you haven't yet responded, please do so.)

Responses came from physicians who trained here between 1920 and the present. They represent 48 states, Washington, D.C., Puerto Rico and Guam. South Dakota and Alaska were the only states not represented.

The physicians are in virtually every specialty, with the most responses coming from internal medicine, surgery and pediatrics. Other specialties with high rates of return were ophthalmology, psychiatry, obstetrics/gynecology, radiology, otolaryngology, neurology and anesthesiology.

Respondents were asked to rate the quality of their residency or fellowship training here as strongly positive, positive, negative or strongly negative. Of the more than two-thirds who answered this question, 76 percent said strongly positive and 23 percent said positive. The remaining 1 percent (eight physicians) included two who checked positive and strongly negative, and indicated a negative personal experience but a positive professional experience; one who checked positive and strongly negative and said that several mentors were positive influences in what was otherwise a negative experience; four who checked negative and one who checked strongly negative.
Responses included a wealth of comments about personal experiences and overwhelming testimonials to how well their work here prepared them for their professional lives, and how much their relationships with respected and admired mentors influenced them. A small number recommended changes, some of which may have been made in the years since they were here.

It is apparent from the questionnaires that these former house staff and fellows are extraordinarily accomplished and have made major contributions to clinical care, research, medical education and community improvement wherever they serve. Their responses will be studied and reviewed in this and future Outlook articles. Here are some of their comments:

"A great year, but I'm still catching up on my sleep."

"I am extremely proud of my training, and it carries a reputation recognized worldwide. I have done everything in my power not to disgrace or dishonor it."

"All staff physicians should be required to receive yearly CME credits regarding how to teach and communicate with students and residents."

"Barnes-Washington University was the high point of my life in medicine. Nothing has matched it since."

"I think all residents need emphasis on kindness to patients and clear explanation of problems and treatment options."

"Greater camaraderie between residents and faculty was sorely needed. Faculty must attend residents' presentations."

"Great training program in all respects."

"The nursing staff at Barnes was superb and did so much to steer me and my fellow house officers safely through our training. Please put in a big plug for them."

"Greater sensitivity to cultural and religious needs of minorities."

"Not everyone is a WASP."

"Barnes Hospital in 1965 provided an outstanding internship without the foolish gamesmanship I had encountered during my medical school years and showed me that higher academic standards could be achieved in the absence of stodginess, ageism and sexism."

"My training at Jewish Hospital was excellent."

"Put more emphasis on ambulatory care and outpatient practice of medicine." (This was the suggestion most frequently made.)

"There should be time set aside during fellowship and possibly residency training to be spent in the offices of some of the many fine private practitioners affiliated with the medical school hospitals."

"Needed more time to read."

"I look back on my experience as three of the most profitable years of my career."

"I will always consider my experience at Washington University/St. Louis Children's as the most influential in my professional life and career."

"Medical ethics should be an explicit part of the curriculum of residents as well as students."

"Need more office-based experience, risk management training, practice management and financial and economics exposure."

"My years there were the best. Also the hardest!"

"The intensity of my internship has barely dimmed: an incredible journey of learning and pride, fears and fatigue, emotional growth and financial despair. I enjoyed the cafeteria food, bolting it down between the frenzy of phone calls and appointments and rounds and scut work. I recall many fine women and men working very hard to save lives and savor life!" (This came from a physician who has been practicing for 28 years.)

Although the mailing was not intended as a solicitation, a number of respondents included gifts along with their questionnaire. To those who did so, our thanks on behalf of the School of Medicine. Your generosity is appreciated and your gift will be carefully stewarded.
'30s

Paul Buss, M.D. ’34, and Martha Beem Buss, NU ’34, celebrated their 60th wedding anniversary in 1994 and moved from Orange County CA to Kalamazoo MI to be nearer their son and his family.

C. Rush McAdam, M.D. ’35, received the Chancellor’s Medallion from Blanche M. Touhill, chancellor of the University of Missouri, St. Louis, on June 15, 1994. The award is presented for exemplary leadership and dedication to the principles of higher education.

Marion J. Dakin, M.D. ’38, writes, “It’s been a busy year. Wonderful Washington University alumni trip to India in the spring. Beautiful three-week trip in China in the fall with my #1 daughter.”

'40s

Ralph Berg, Jr., M.D. ’45, retired at the end of August 1994 from his distinguished career as a cardiothoracic surgeon in Spokane WA. He pioneered open heart surgery in the Pacific Northwest and received the University’s Distinguished Alumni Award in 1985.

James O. Davis, M.D. ’45, writes that he has continued his research interest in the pathogenesis of heart failure and recently has written an article: “An extra-adrenal sodium-retaining factor in congestive heart failure” for publication in the new Journal of Cardiac Failure.

Robert H. Tanner, M.D. ’47, retired in 1993 but still does some work for clinics, hospices and vocational rehabilitation programs. He writes that his “golf game is no better — but fun.”

'50s

William N. Chambers, M.D. ’50, retired in January 1993 from the practice of outpatient psychotherapy and forensic psychiatry in which he had engaged since 1978. Prior to that he was on the faculty of the University of South Florida School of Medicine at Tampa. Since retiring he has traveled to Europe, Central America and Mexico. “I came back from Africa sick in January 1994. Unspecified myopathy. But I hope to be going again soon,” he says.

Marvin E. Levin, M.D. ’51, was visiting professor of medicine at the University of Indonesia School of Medicine in Jakarta and at the Airlangga University School of Medicine in Surabaya. He also was visiting professor at the Chang Gung Medical College in Taipei, Taiwan, and at the Kaohsiung Medical College in Kaohsiung, Taiwan.

Edward C. Lynch, M.D. ’56, recently assumed office as Governor for the South Texas Chapter of the American College of Physicians (ACP) during the society’s 76th annual session. Lynch, who will serve a four-year term as governor, is a professor and associate chair and director of the residency training program at Baylor College of Medicine in Houston. He also is an attending physician at both the Methodist Hospital and the Ben Taub General Hospital.

Cecil R. Auner, M.D. ’52, retired at the end of 1994 from the position of geriatric coordinator of family practice residency at Cox Health Systems in Springfield MO.

James W. Maas, M.D. ’54, received the 1994 Award for Psychiatric Excellence from the Texas Society of Psychiatric Physicians. Maas was the Hugo A. Auler Professor of Psychiatry at the University of Texas Health Science Center at San Antonio. (Editor’s note: At presstime, Outlook learned of the untimely death of Dr. Maas on January 14, 1995.)

Gilbert P. Gradinger, M.D. ’56, is serving for 1994 - ’95 as chairman of the American Board of Plastic Surgery.

'60s

Dick Briggs, Jr., M.D. ’60, is professor and vice chairman of the Department of Medicine at the University of Alabama, Birmingham, and holds the Eminent Scholar Chair in Pulmonary Diseases.

Hubert C. Huebl, M.D. ’56, continues the practice of general surgery in Dearborn MI.

Edward H. Forgetson, M.D. ’57, and his wife, Ann, have opened an antique silver gallery called Casa Ana, across from the famous Coyote Cafe in Santa Fe NM. They invite vacationing fellow alumni to “view the majestic mountains, smell the pinyon fires...and stop to say hello.”

Lawrence C. Pakula, M.D. ’57, is serving a two-year term as vice president of The Johns Hopkins Medical and Surgical Society.

Donald Y. Goldman, M.D. ’58, a member of the attending staff at Rochester General Hospital (NY), has been elected president of the 3,000-member New York State Society of Internal Medicine.
Joe R. Utley, M.D. '60, and Joella F. Utley, M.D. '67, visited Beijing, China, where Joe lectured at the Chinese Society for Cardiovascular Surgery, and Joella visited the National Cancer Hospital.

Ronald E. Rosenthal, M.D. '61, has been named to the board of regents of the American College of Surgeons.

Sharon Koch-Parrish, NU '64 and '69, is professor of nursing at Florida Hospital College of Health Sciences in Orlando. A highlight of 1994 was the presentation, in Canberra, Australia, of her doctoral research on critical thinking.

Walter Dickinson, M.D. '65, is professor of surgery at the University of New Mexico and resides in Santa Fe.

Joshua Grossman, M.D. '65, and Mickey Grossman, OTR, '65, celebrated their 30th anniversary on stage in the Johnson City TN Community Theater production of "Twelve Angry Americans" (initially "Twelve Angry Men"). Joshua played Juror #10 and Mickey, Juror #12. Their children, now students at the University of Alabama-Birmingham, George Mason University and Duke University, were among the audience.

Richard S. Myers, M.D., '65, a general surgeon in Raleigh NC, has been appointed to the board of trustees of Rex Hospital in Raleigh. He is the first physician appointed to that hospital's board in its 100-year history.

Leonard A. Nickels, HAP '67, retired February 1, 1994, as administrator of the Ferrell-Duncan Clinic in Springfield MO, a position he'd held for more than 26 years. He now directs system development for Cox Health Systems, also of Springfield.

Frank Vinicor, M.D. '67, was named president-elect of the American Diabetes Association at the organization's 54th annual meeting. He is director of diabetes translation at the Centers for Disease Control and a clinical associate professor of medicine at both Emory University in Atlanta and Indiana University in Indianapolis. Vinicor also directs the World Health Organization Collaborating Center on Diabetes Mellitus.

'70s

Larry L. Mathis, HAP '72, received the 1994 Health Administration Program's Outstanding Alumnus Award. Mathis was chosen for his outstanding involvement and high-level leadership in the healthcare industry. He is president and chief executive officer of The Methodist Hospital System in Houston.

Stephen C. Reynolds, HAP '72, has been named president and CEO of Baptist Memorial Health Care System (Memphis). He is the second person to lead the group of 30 corporations that include 15 hospitals serving western Tennessee, northern Mississippi and eastern Arkansas.

Ronald B. Ziman, M.D. '73, is associate clinical professor of neurology at UCLA; the second vice chairman, board of directors of Granada Hills Hospital, and medical director of electrophysiology at Northridge Hospital Medical Center.

Donald R. Graham, M.D. '74, has completed a fellowship in infectious diseases and served what is now the Centers for Disease Control and Prevention. He now chairs the division of infectious diseases at the Springfield Clinic in Springfield IL. In 1995, he will serve as president-elect of the Sangamon County Medical Society.

Lawrence E. Blanchard, III, M.D. '76, is currently serving as president of the Richmond Academy of Medicine, based in Richmond VA. He has practiced dermatology in Richmond, his hometown, since 1980.

Peter G. Smith, M.D. FHS '76-'81, was the guest of honor and keynote speaker at the annual meeting of the American College of Osteopathic Otolaryngology-Head and Neck Surgery in April in Orlando.

Marilou Terpenning, M.D. '76, left the full-time faculty of UCLA School of Medicine in 1988 to open a private practice of hematology/oncology in Santa Monica. She remains on UCLA's clinical faculty.

Clifford B. Saper, M.D. '77, is the Putnam Professor of Neurology and Neuroscience at Harvard Medical School and the chairman of neurology at Beth Israel Hospital.

Mary R. Schwartz, M.D. '78, is associate professor of pathology at Baylor College of Medicine in Houston. She and her husband, also a physician, are kept busy by Jacqueline, four, and Daniel, 15 months.

Kathy Johnston, M.D. '79, is a dermatologist in Torrance CA, while husband, Matt Scheibe, is at home with the couple's four children in Rolling Hills Estates CA.

Howard Silverman, M.D. '79, has been named president of Intellistudy Corp., a leading provider of computer-based training materials to law students.

'80s

Myron Tanenbaum, M.D. '81, is a clinical assistant professor of ophthalmology at the Bascom Palmer Eye Institute, University of Miami School of Medicine. He recently edited and helped author the third edition of the textbook, Oculoplasty Surgery.

Stuart Sherman, M.D. '82, is director of pancreaticobiliary endoscopy at Indiana University Medical Center.

Sari R. Levine, M.D. '85, continues to practice urology in what she calls "paradise. Mountain View CA is the greatest, and so are my partners."

Scott Shuey, P.T. '86, and his wife, Kim, became parents on August 11, 1994, with the birth of their daughter, Lauren Elizabeth, in Greenville SC.
Charles F. Chandler, M.D. ’88, has completed general surgery training at UCLA and is now an assistant professor in residence, University of California, Irvine. Daughter Rachel, seven, is an "outstanding" ice skater. Her sister, Natalie, five, wants to be an actress.

'90s

Neil K. Worrall, M.D. ’91, and his wife announce the birth of their first child, Emily Baylis Worrall, on August 19, 1993.

Jon Morris, M.D. ’92, was married to the former Kriste Miner on June 26, 1993. Morris is in the second year of his residency at Stanford.

Susan Conley, M.D., FHS in pediatrics, has been appointed professor of pediatrics at Stanford School of Medicine where she was recruited to be medical director of the Pediatric Dialysis and Transplant Program at Packard Children’s Hospital.

Gilbert B. Forbes, M.D., FHS in pediatrics, and a former member of the pediatrics faculty, is the recipient of the John Howland Award from the American Academy of Pediatrics for 1992. He is professor emeritus of pediatrics at the University of Rochester School of Medicine and Dentistry and is still active in research and teaching there.

Daniel T. Layish, M.D., FHS, writes that his son, Adam, is now a year old and that the family enjoys living in North Carolina where Layish is doing a pulmonary/critical care fellowship at Duke.

Morton R. Lazar, M.D., FHS in obstetrics and gynecology, has been retired since 1986, dividing his time between Michigan and Florida, with golf his main activity.

William R. Platt, M.D., FHS in pathology, continues as senior lecturer in pathology at The Johns Hopkins University School of Medicine. He also is at work on the third edition of his Color Atlas Of

Hematology, Oncology and Transfusion Medicine. His wife, Jeanette, is a painter, sculptress and consultant in medical illustration.

John S. Spratt, M.D., FHS in surgery, has been granted the status of Diplomate in Healthcare Administration by the American Academy of Medical Administrators. Spratt is professor of surgery and health systems at the University of Louisville.

Carol Williams, M.D., FHS in obstetrics and gynecology, received the Community Service Award from the American Medical Women’s Association.

IN MEMORIAM

Eli Robins, M.D., professor emeritus and head of the Department of Psychiatry from 1963 until 1975, died on December 21, 1994, at Barnes Hospital after a long illness. He was 73.

Robins, a leading figure in the modern revolution of American psychiatric thinking, helped to bring psychiatric research from the Freudian dynamic approach that dominated the 1940s to an empirical scientific approach based on diagnostic criteria. An article he co-authored in 1972, “Diagnostic Criteria For Use in Psychiatric Research,” is the most frequently cited paper in the field of psychiatry. Along with the subsequent work of others, it served as the basis for the American Psychiatric Association's adopting specific criteria for psychiatric diagnoses. This change made it possible for clinicians and researchers to agree on diagnostic criteria and formed the cornerstone for modern research into biomedical and social factors in psychiatric disorders.

Robins came to Washington University in 1949 as a fellow to work with Oliver Lowry, M.D., Ph.D., in pharmacology. In 1951, he joined the faculty as an instructor in neuropsychiatry. He became a professor of psychiatry in 1958 before being named head of the department in 1963. In 1966, he was named the Wallace Renard Professor of Psychiatry. He also served, from 1951 until his death, as a psychiatrist at Washington University Medical Center hospitals.

Robins was born in Houston, Texas, on February 22, 1921. He received his bachelor’s degree in 1940 from Rice University in Houston and his medical degree in 1943 from Harvard Medical School.

He authored more than 175 peer-reviewed publications that covered the broad range of his research into suicide, hysteria, homosexuality and the neurochemistry of depression. He also wrote books about homosexuality and about people who committed suicide.

A memorial service for Robins was held February 4 in Graham Chapel. He is survived by his wife of 48 years, Lee N. Robins, Ph.D., of Clayton, University Professor of Social Science at Washington University; four sons, Paul Robins of Menlo Park CA; James Robins of Cambridge MA; Thomas Robins of Ann Arbor MI; and Nicholas Robins of San Francisco, and six grandchildren.

Donald C. Shreffler, Ph.D., professor of genetics, died August 8, 1994, after having a heart attack while driving his car. He had pulled to the side of the road. He was 61.

Shreffler had been professor of genetics since 1975, and from 1977 to 1984, he was the James S. McDonnell Professor and head of genetics. His work centered on the pursuit of genes in the major histocompatibility complex and complement-associated MHC molecules. He was elected to the National Academy of Science in 1982. Colleagues described him as "a humble man, not comfortable in the limelight," and "an extraordinary man who epitomized the gentleman scientist." Among his survivors are his wife, two sons and three sisters.
Walter W. Davis, Jr., director of facilities management, left, and Carolyn Baum, Ph.D., Elias Michael Director of the Program in Occupational Therapy, take part in the groundbreaking ceremony for the new 130-seat auditorium/classroom being constructed at 4444 Forest Park. The addition is scheduled to be completed in May and is part of the new facilities for the expanding OT faculty and staff, which moved to the location in January. To Baum’s left are Jane Lux, associate director of professional and program development; Cathy Rose, associate director of professional program; Craig Kohlbrecher, class of ’95 co-president; Rita Chang, class of ’95 co-president; Jamie Simonelt, architect, Stone Marraccini Patterson (SMP); Jeff Bannister, BSI project manager; Fred DeWeese, design and construction director; Rick Ottolino, SMP project principal; Patti Lees, student association president; Angela Serig, class of ’96 co-president; Cherin Chaykowski, class of ’96 co-president; and Jim Liberman, design and construction project manager.
Vanessa Boyd, registered respiratory therapist at Barnes Hospital, demonstrates how to intubate a patient in respiratory failure to Dawn York, a student at Gateway Institute of Technology, during a Health & Science Career Fair held at the medical school in February. The event, sponsored by the Office of Minority Student Affairs, introduced more than 135 students from eight area high schools to a variety of health and science careers.